

400 to 800°C in the presence of steam vapor, said catalyst comprising aluminum oxide and 7.2 to 49.4 wt.% of nickel oxide; and

decomposing the at least one compound by hydrolysis and producing a treated gas containing hydrogen fluoride.

33. (NEW) A process according to Claim 32, further comprising washing the treated gas with water to remove the hydrogen fluoride.

34. (NEW) A process according to Claim 32, further comprising washing the treated gas with an alkaline solution or slurry to remove the hydrogen fluoride.

35. (NEW) A process according to Claim 32, further comprising washing the treated gas with water and subsequently contacting the water that has absorbed the hydrogen fluoride with an alkaline solution or slurry.

36. (NEW) A process according to Claim 32, wherein the catalyst further comprises at least one of zinc oxide and titanium oxide.

37. (NEW) A process according to Claim 32, wherein the catalyst consists essentially of alumina and nickel oxide.

38. (NEW) A process according to Claim 32, wherein the at least one compound is at least one compound selected from the group consisting of CF₄, C₂F₆, C₃F₈, C₄F₈, C₅F₈, CHF₃, CH₂F₂, CH₃F, C₂HF₅, C₂H₂F₄, C₂H₃F₃, C₂H₄F₂, C₂H₅F, CH₂OCF₂, SF₆, and NF₃.

39. (NEW) A process according to Claim 32, wherein the at least one compound is at least one compound selected from the group consisting of CF₄, C₂F₆, C₃F₈, C₄F₈, C₅F₈, CHF₃, CH₂F₂, CH₃F, C₂HF₅, C₂H₂F₄, C₂H₃F₃, C₂H₄F₂, C₂H₅F, SF₆, and NF₃.

SUBP1

40. (NEW) A process for treating a fluorine compound-containing gas, comprising: contacting a gas stream containing at least one compound consisting of (a) carbon and fluorine, (b) carbon, hydrogen and fluorine, (c) carbon, hydrogen, oxygen and fluorine, (d) SF₆, and (e) NF₃, with a catalyst comprising alumina as an active component and 7.2 to 49.4 wt.% of nickel oxide, said catalyst containing a composite oxide of alumina and nickel oxide;

adding steam or a reaction gas containing steam and oxygen to the gas stream; and

effecting a hydrolysis reaction between the at least one compound and the steam, thereby producing a treated gas containing hydrogen fluoride.

41. (NEW) A process according to Claim 40, further comprising washing the treated gas with water to remove the hydrogen fluoride.

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42. (NEW) A process according to Claim 40, further comprising washing the treated gas with an alkaline solution or slurry to neutralize the hydrogen fluoride and other acidic compounds.

43. (NEW) A process according to Claim 40, further comprising washing the treated gas with water and subsequently neutralizing the water that has absorbed the hydrogen fluoride with an alkaline solution or slurry.

SUBP2

44. (NEW) A process according to Claim 40, wherein the catalyst further comprises 22 to 40.6% by weight of zinc oxide.

45. (NEW) A process according to Claim 40, wherein the catalyst consists essentially of alumina and nickel oxide.

46. (NEW) A process according to Claim 40, wherein the at least one compound is at least one compound selected from the group consisting of CF₄, C₂F₆, C₃F₈, C₄F₈, C₅F₈, CHF₃, CH₂F₂, CH₃F, C₂HF₅, C₂H₂F₄, C₂H₃F₃, C₂H₄F₂, C₂H₅F, CH₂OCF₂, SF₆, and NF₃.

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47. (NEW) A process according to Claim 40, wherein the at least one compound is at least one compound selected from the group consisting of CF₄, C₂F₆, C₃F₈, C₄F₈, C₅F₈, CHF₃, CH₂F₂, CH₃F, C₂HF₅, C₂H₂F₄, C₂H₃F₃, C₂H₄F₂, C₂H₅F, SF₆, and NF₃.

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48. (NEW) A method of treating a gas containing a perfluoro-compound, comprising:

contacting the gas at a temperature of 400 to 800°C with a catalyst comprising aluminum oxide as an active component and 7.2 to 49.4 wt.% of nickel oxide in the presence of steam, whereby the perfluoro-compound is decomposed by hydrolysis to produce a treated gas containing hydrogen fluoride and acidic compounds; and

contacting the treated gas with water to absorb the hydrogen fluoride and the acidic compounds from the treated gas.

49. (NEW) A process according to Claim 48, wherein the perfluoro compound is at least one compound selected from the group consisting of CF₄, CHF₃, C₂F₆, C₃F₈, C₄F₈, SF₆ and NF₃.

50. (NEW) A process according to Claim 48, wherein the catalyst further comprises zinc oxide, the balance being aluminum oxide.

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51. (NEW) A process according to Claim 48, wherein the catalyst consists essentially of alumina and nickel oxide.

52. (NEW) A process for treating a gas, comprising:

contacting a gas stream containing at least one compound consisting of (a) carbon and fluorine, (b) carbon, hydrogen, and fluorine, (c) carbon, hydrogen, fluorine, and oxygen, (d) SF₆, and (e) NF₃, with a catalyst at a temperature of 400 to 800°C in the presence of steam vapor, said catalyst comprising aluminum oxide as an active component and zinc oxide; and

decomposing the at least one compound by hydrolysis and producing a treated gas containing hydrogen fluoride and an acidic compound.

53. (NEW) A process according to Claim 52, further comprising washing the treated gas with water to remove the hydrogen fluoride and the acidic compound.

54. (NEW) A process according to Claim 52, further comprising neutralizing the treated gas with an alkaline solution or slurry to neutralize the hydrogen fluoride and the acidic compound.

55. (NEW) A process according to Claim 52, further comprising washing the treated gas with water and subsequently contacting the water that has absorbed the hydrogen fluoride with an alkaline solution or slurry.

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56. (NEW) A process according to Claim 52, wherein the catalyst comprises 22 to 40.6% by weight zinc oxide.

57. (NEW) A process according to Claim 52, wherein the catalyst further comprises nickel oxide.

58. (NEW) A process according to Claim 56, wherein the catalyst consists essentially of alumina and zinc oxide.

59. (NEW) A process according to Claim 52, wherein the at least one compound is at least one compound selected from the group consisting of CF₄, C₂F₆, C₃F₈, C₄F₈, C₅F₈, CHF₃, CH₂F₂, CH₃F, C₂HF₅, C₂H₂F₄, C₂H₃F₃, C₂H₄F₂, C₂H₅F, CH₂OCF₂, SF₆, and NF₃.

60. (NEW) A process according to Claim 52, wherein the at least one compound is at least one compound selected from the group consisting of CF₄,

C2F6, C3F8, C4F8, C5F8, CHF3, CH2F2, CH3F, C2HF5, C2H2F4, C2H3F3, C2H4F2, C2H5F, SF6, and NF3.

61. (NEW) A process for treating a fluorine compound-containing gas, comprising:

contacting a gas stream containing at least one compound consisting of (a) carbon and fluorine, (b) carbon, hydrogen and fluorine, (c) carbon, hydrogen, oxygen and fluorine, (d) SF6, and (e) NF3, with a catalyst comprising alumina as an active component and zinc oxide, said catalyst in the form of a composite oxide of alumina and zinc oxide;

adding steam or a reaction gas containing steam and oxygen to the gas stream; and

effecting a hydrolysis reaction between the at least one compound and the steam, thereby producing a treated gas containing hydrogen fluoride and an acidic compound.

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62. (NEW) A process according to Claim 61, further comprising washing the treated gas with water to remove the hydrogen fluoride and the acidic compound, wherein the acidic compound is selected from the group consisting of CO2, NO, and SO3.

63. (NEW) A process according to Claim 61, further comprising washing the treated gas with an alkaline solution or slurry to remove the hydrogen fluoride and the acidic compound.

64. (NEW) A process according to Claim 61, further comprising washing the treated gas with water and contacting the water that has absorbed the hydrogen fluoride and the acidic compound with an alkaline solution or slurry.

65. (NEW) A process according to Claim 61, wherein the catalyst comprises an amount of 22 to 40.6% by weight of zinc oxide.

66. (NEW) A process according to Claim 61, wherein the catalyst further comprises nickel oxide, the balance being alumina.

67. (NEW) A process according to Claim 65, wherein the catalyst consists essentially of alumina and zinc oxide.

68. (NEW) A process according to Claim 61, wherein the at least one compound is at least one compound selected from the group consisting of CF_4 , C_2F_6 , C_3F_8 , C_4F_8 , C_5F_8 , CHF_3 , CH_2F_2 , CH_3F , C_2HF_5 , $\text{C}_2\text{H}_2\text{F}_4$, $\text{C}_2\text{H}_3\text{F}_3$, $\text{C}_2\text{H}_4\text{F}_2$, $\text{C}_2\text{H}_5\text{F}$, CH_2OCF_2 , SF_6 , and NF_3 .

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69. (NEW) A process according to Claim 61, wherein the at least one compound is at least one compound selected from the group consisting of CF_4 , C_2F_6 , C_3F_8 , C_4F_8 , C_5F_8 , CHF_3 , CH_2F_2 , CH_3F , C_2HF_5 , $\text{C}_2\text{H}_2\text{F}_4$, $\text{C}_2\text{H}_3\text{F}_3$, $\text{C}_2\text{H}_4\text{F}_2$, $\text{C}_2\text{H}_5\text{F}$, SF_6 , and NF_3 .

70. (NEW) A method of treating a gas containing a perfluoro-compound, comprising:

contacting the gas at a temperature of 400 to 800°C with a catalyst comprising aluminum oxide and zinc oxide in the presence of steam, whereby the perfluoro-compound is decomposed by hydrolysis to produce a treated gas containing hydrogen fluoride; and

contacting the treated gas with water to absorb hydrogen fluoride from the treated gas.

71. (NEW) A process according to Claim 70, wherein the perfluoro-compound is at least one compound selected from the group consisting of CF_4 , CHF_3 , C_2F_6 , C_3F_8 , C_4F_8 , SF_6 and NF_3 .

72. (NEW) A process according to Claim 70, wherein the catalyst comprises an amount of 22 to 40.6% by weight of zinc oxide.